

Assessment and Discussion Questions:

***Adaptations and Interactions
in the Estuary.***

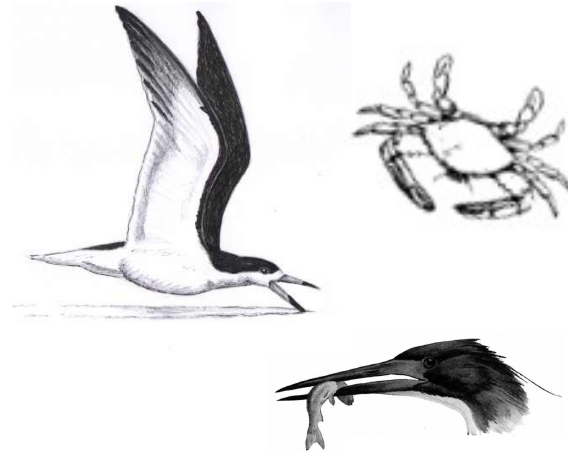
The following student study questions are intended for students from 6th to 8th grade.

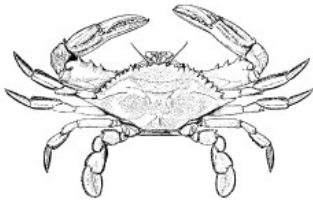
Note to the teacher:

1. These questions are intended to stimulate classroom discussion/debate and as a resource for assessment following lessons and activities.

2. Before attempting these study questions, students should be familiar with the following key words and concepts:

Adaptations
Buoyancy
Commensalism
Detritus
Estuary
Invasive species
Invertebrate
Mutualism
Parasitism
Plankton
Symbiosis





Blue Crab

1. The blue crab is one of the fastest swimming crabs in the world. Their incredible swimming speed can best be attributed to the crab s' ...

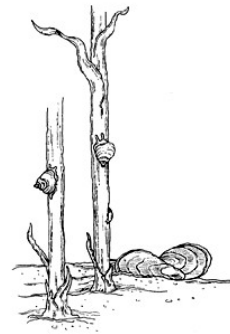
- A. large claws.
- B. jointed legs.
- C. body shape.
- D. paddle-like rear appendages



Ibis

2. An Ibis is best adapted to feeding ...

- A. by diving into the water and striking small fish.
- B. by picking at invertebrates and small fish in shallow water.
- C. by picking small insects from the bark of trees.
- D. by filtering plankton and small fish from large volumes of water.



3. By living on the stalks of marsh plants, periwinkles gain protection from predators and feed on floating material. The plants appear to be unaffected by the snails. This symbiotic relationship of the periwinkle to the cattail is best described as ...

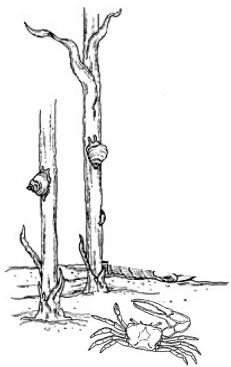
- A. parasitism
- B. commensalism
- C. mutualism
- D. predatorism



Barnacles

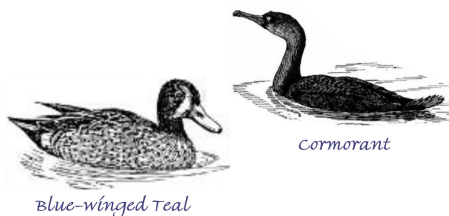
4. Barnacles are sessile crustaceans, meaning that in their adult stage they are permanently attached to a hard surface. By congregating in one area, barnacles gain ...

- A. more opportunity for reproduction.
- B. better protection from predators.
- C. more surface area for contact.
- D. All of the above.



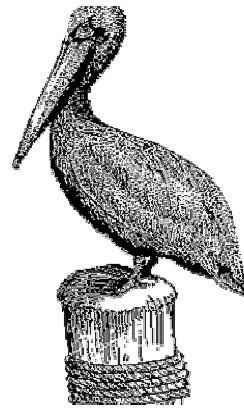
5. In the marsh, fiddler crabs dig burrows in the mud which provide a pathway for nutrients and oxygen to reach to roots of marsh grasses. The roots of the marsh grasses stabilize the muddy burrows and the stalks provide protective cover and habitat for snails, a major component of the crab's diet. This symbiotic relationship of the marsh grasses and the fiddler crab is best described as ...

- A. parasitism
- B. commensalism
- C. mutualism
- D. predatorism



6. The feathers on a Blue-Winged Teal trap air which gives the ducks additional buoyancy for swimming. Cormorant feathers, however, are less able to trap air. Because of this difference in their feathers, Cormorants are better adapted to ...

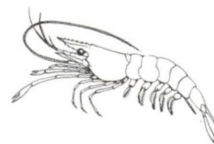
- A. flying long distances.
- B. floating with most of their body above the water surface.
- C. swimming underwater.
- D. staying dry.



Brown Pelican

7. The Brown Pelican is best adapted to feeding ...

- A. by diving into the water and striking small fish.
- B. by picking small insects from the bark of trees.
- C. by filtering plankton and small fish from large volumes of water.
- D. by picking at invertebrates and small fish in shallow water.



Grass shrimp

8. Grass shrimp can be found suspended among the shallow waters of the marsh feeding on suspended decomposing material. The feeding habits of grass shrimp define their role as ...

- A. biomass producers.
- B. nutrient recyclers.
- C. primary consumers.



Black Skimmer

9. Skimmers are recognized as the only North American bird with the lower mandible longer than the upper. Due to this unique feature, skimmers are best adapted to feeding ...

- A. by flying near the surface of the water collecting insects and small fish as they fly.
- B. by picking small insects from the bark of trees.
- C. by picking at invertebrates and small fish in the shallow water of the marsh.
- D. by filtering plankton and small fish from large volumes of water.



10. In North America, Nutria are considered an invasive species and can be found residing in estuarine marshlands. Their classification as an invasive species is best attributed to which of the following facts?

- A. They are near the top of the food chain.
- B. They were introduced to North America in the mid 1900 s.'
- C. Their feeding habits include digging up the roots of marsh grasses.
- D. They are mobile on land and in the water.

*Prepared by Brent Stafford for the Galveston Bay Estuary Program.
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Answer Summaries to:

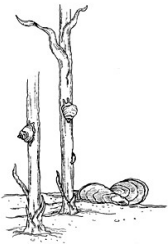
Adaptations and Interactions in the Estuary (Grades 6-8)



1. (D) Blue Crabs are known as some of the fastest swimming crabs around. This is because their fifth pair of legs has been modified into "paddle-like" appendages, called swimmerets. Blue crabs are an important estuarine resource for many seafood eaters around the world.



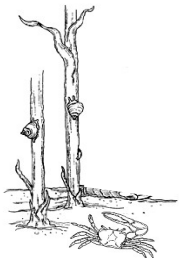
2. (B) An Ibis is a shore bird that can often be seen in the shallow waters of the marsh and tidal mudflats as it feeds on stranded fish and retreating invertebrates. The long legs allow the Ibis to walk easily through the mud and shallow water. Their long curved beak allows them to reach worms and other invertebrates as they retreat to their holes in the mudflats.



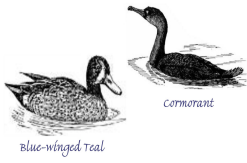
3. (B) Periwinkles are a common marsh snail in many estuaries. They live on the stalks of cattails and other marsh plants, as this environment allows them to gain protection from predators and feed on suspended material. Because the plants seem to be unaffected by the snail, this symbiotic relationship can best be described as commensalism.



4. (D) Barnacles may congregate for many reasons. The advantages to congregating include; more opportunities for reproduction, better protection from predators, and more surface area for contact.



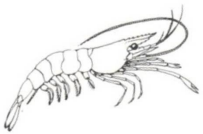
5. (C) Fiddler crabs gain protective cover, a stable burrow, and a source of food by living among the marsh grasses. The burrows built by the crabs provide a pathway for nutrients and oxygen to reach to roots of marsh grasses. Because they the crabs and the marsh grasses both benefit, This symbiotic relationship of the marsh grasses and the Fiddler Crab is best described as mutualism.



6. (C) Duck feathers are better adapted to trap air which gives the ducks additional buoyancy for swimming and allows them to dry quickly. Cormorant feathers, however, are less able to trap air. Because of this difference in their feathers, Cormorants are better adapted at swimming for long distances underwater and are exceptional at catching fish. Because their feathers don't dry as quickly, Cormorants can often be seen drying their wings by standing upright with their wings extended.



7. (C) Brown Pelicans fly just above the water surface with their necks folded, heads resting on their backs, using slow, powerful wingbeats. When they feed, they dive beak-first into the water, returning to the surface with a mouthful of fish. Their massive bills, elastic throat pouch, and strong bodies are exceptional features for this type of feeding behavior.



8. (B) Grass shrimp play an important role as a source of food for juvenile estuarine fish and coastal and migrating birds. Equally important, however, is their role as a consumer of decomposing detritus, which ultimately results in the release of nutrients back into the aquatic ecosystem.



9. (A) The unique longer lower mandible allows the skimmer to fly near the surface of shallow water collecting insects and small fish. They can be recognized from afar by their black-tipped bill, red legs, and black topside.



10. (C) Nutria are an introduced species because they are not native to North America. They have earned their status as an invasive species because of the dramatic and mostly irreversible damage done to marshlands by digging up and feeding on the roots of marsh grasses.